

ANALYTICAL SURVEY OF ARCHITECTURE, FEATURES & FUNCTIONALITY OF DATA CENTERS IN INDIA

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ABSTRACT

In this paper, analytical survey is being done in Indian data centers and functionality & features are compared. Data centers are critical in terms of security, reliability & consistency. Increasing workload demand in data center, require more powerful computing resources. Features like Total space, bandwidth, power capacity and service level agreement for different data centers are being reviewed. Data centers are being used since many years but specifically in last five years' growth rate of data centers are tremendous. Data centers of different standards belonging to different tiers are being surveyed in this paper. Also redundancies of different data centers are being analyzed as it is important for reliability. The comparative study of data centers will give the idea about overall performance of different data centers in India. Also it is being concluded that which data center is comparative better in specific aspects.

KEYWORDS: Indian Data Center, Capacity, Architecture, Features & Functionality

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INTRODUCTION

The data centre is service comprised of Networked computers and storage. A Data center commercial other officialdoms which is used to organize, process, store and distribute huge volumes of data of many small medium or large company to access applications and services. Data Centre main work is focal point and critical asset for everyday operations [1]. The data center has been playing important role in supporting the enterprise networks and cloud computing services, large-scale computations, web searching, email, online gaming and social networking [2].

Data center designs and architect are unique to generally confidential as internet fronting or initiative data centers. Internet facing data centers support browser based users enterprise data centers service users use but host more applications to custom applications [3]. It is essential to study the difference between a private cloud and the standard data centre. Clouds data center never refer to hardware or physical resources not withstanding they referred to as public, non public or hybrid cloud. The term does not outline something concerning the physical hardware it's running on. Clouds will reside on any hardware, in any knowledge center. They are thought of as Associate in Nursing abstraction layer on top of the physical hardware and knowledge centers reside in any data centre servers.

Virtualization software system runs on servers and higher than resides cloud application programming interface. The Data Center providing access to all resources virtually. This application programming interface allows to automatically provide hardware to scale your resources PRN. A data center is predicated on a virtualization of Private layer term has access [4]. Data center design and architectures and requirements can differ significantly. We need to make optimize infrastructure, efficiency and productivity of data center environment is

running without compromising quality and security of data [26]. Data center operational standards processes and procedures once the data center built. ISO 9000 Quality System, ISO 27001 Information Security these are changing based data center standards [27].

This paper presents the background and motivation of the data center history. Section 3 provides the comparison of data center and functionality. Section 4 has the comparison Features of Data centers in India. Section 5 provides result and study of analysis of Data centers in India followed by conclusions in Section 6 [5].

BACKGROUND & MOTIVATION

Last five years increased more data centers. The Facebook and Google, are considered as private data centers, meaning their purpose is to serve the specific needs of these organizations. Private companies use to centralize their IT operations and equipment centralize manage and disseminate their data. But some companies don't need their own data center so its use Ctrls and TATA host exist [6]. The Data Center of modern software technology serving a critical role in the growing capabilities for enterprises services.

In 1950s the concept of data centres has been create after American Airlines and IBM partnered to a passenger reservations system offered by Sabre [7]. In 1960s computers mainframes were stored in rooms but we need a data center now-a-days. They were expensive and businesses may hire out area and mainframe to fulfil specific functions. Throughout the Nineteen Eighties, the pc business practised the boom of the digital computer era and computers were being wide employed in the workplace. The dot-com bubble occurred within the Nineties success packed with knowledge centers. Businesses required a fast thanks to establish presence on the net. The dot-com bubble occurred in the 1990s success full of data centers. Businesses needed a fast way to establish data center to present on the Internet and companies like Rack space were fulfilling the need by opening up data centers [8].

The fast growth of the number of websites and applications required physical storage in 2000s. The large amounts of data storage were essential to make individuals programs run on internet browser. Virtualized data centers were derived between 2003 and 2010, the virtual technology revolution. The computing network and storage from several previously isolate data centers to create a central, that could be reallocated based on needs additional flexible resources [9]. The data centers are attractive and more complex in producing the amount of computer power and power density to increase their need of load balancing [23]. In 2011, seventy two percent of organizations have their own and data centers make twenty five percent of virtualization. SLI in initial stages is measured the next step in the evolution of data centers. Virtualization and cloud computing combination of server virtualization of software defined networks. Software Defined Storage and automation can alter the creation of a very dynamic virtualized knowledge center. SDN and Software Definite Storage are the new technologies that need nonetheless been firmly established inside the information data center. They will have a place in the eventual vision of the fully automated and dynamic SLI [9].

DATACENTERS IN INDIA

Ctrls Data Center

Ctrls data center is eighteen years old and Pioneer Group has built the largest accessible infrastructure in the worldwide. In India, Data centers were established on October 2007. Ctrl s data center is Asia's largest Tier four centers and managed services supplier. Ctrl S works five data center facilities, together with four Tier data centers in Hyderabad, Mumbai, Noida, Bangalore, and Tier three data center in Mumbai it has one hundred MW hyper-scale facility. The corporate acts as

a trust worthy consultant to over three, 500 Indian, international and multi nationals. About 1000000 sq. ft. 7 locations Bandwidth provide 2Mbps to 2Gbps, it depends on requirement. Ctrl's all data center power capacity per rack is 3kw to 15 kw. Seven data centers are in India and 99.99% Service level agreement for uptime. It also provide firewall, five six, eight and nine zone security, also quake proof facility, cloud management port, SSL services [10].

Reliance Data Center

Reliance Data Center is the leading provider of outsourced data center infrastructure for administrations with mission-critical IT operations. Reliance data centre provides reliable, scalable hosting, network, application and consulting services. Reliance DC provides services like similar Co-location, Managed hosting, Storage and data Backup, Network connectivity, Application and managed hosting. Reliance manages Zero downtime hosting and manages services which provide essential security and speed. In India, nine data centers with 650000sq.ft hosting space and Tier III+ with N+N redundancy. Reliance Data Centre Infrastructure for organizations with mission-critical IT operations. Reliance use Synchronous Transport Module bandwidth is the SDH ITU-T Optical Fiber Cable network transmission standard bit rate of 155.52 Mbit/s. Power capacity information is not provided in above table. Reliance gives 100% Service level agreement and Tier3+ Data center Standards. Also provide firewall, cloud management portal, SSL Certificates services. Reliance DC connects to government establishment, banking and financial organizations, Mass media companies and educational institutions [11].

Gujarat State Data Center

Gujarat Informatics Limited was established as the nodal agency in 1999. The company was started to help information technology to grow fast and accelerate the process of E-Governance in the state. The Government had enabled Gujarat Informatics Limited to successfully implement the information technology projects in the state [12]. Gujarat State Data Centre (GSDC) was under the National e-Governance Plan (NeGP) of Government of India. Gujarat State data center facility acquaintance Centre can act as a representative and convergence purposed between open unsecured property right and sensitive government surroundings. Gujarat State Data Centre has been identified as a work for core and critical infrastructure. The data center components are used for consolidation and hosting of applications and storage that are essential for the delivery of e-Governance services. GSDC have total capacity 7000sqft SDC in India and five data center in Gujarat. Service level agreement of 99.74% and Tier 2 is a standard data center. GSDC has 200+ servers and 84 Racks with 200TB Storage. Gujarat state data center has 49 applications and 228 websites hosted and 83184 Mailboxes. Gujarat Informatics Limited has more than fifty new storage server deploys for service provide to SRDH-UIDAI, CTP, Food and Civil, BISAG. Gujarat state data center also provide mini data center or colocation data center at Rajkot, Surat, Vadodara, Mahesana city. Gujarat state data center provide decentralized services citizens in state [13].

BSNL Data Center

Bharat Sanchar Nigam Limited (BSNL) provides IDC data centre and services. BSNL is a leading telecom service provider in India and seven data centers are located in India at Ahmadabad, Faridabad, Ghaziabad, Jaipur, Ludhiana, Mumbai and Chennai, who maintains most fault tolerant networks [14]. BSNL and Nxt Gen have collaborated to launch dedicated Internet data centres across India to assist you to leverage the facility of cloud computing. Power-driven by BSNL and managed by NxtGen, these facilities can feature the exceptional capability for future enlargement with optimum power, cooling and IT infrastructure performance. BSNL provide 45Mbps Bandwidth. In details of table 1, BSNL have 63440 sq.

ft. Total capacity. BSNL have six data center in India and N+1 Redundancy. Service level agreement is 99.98% up time and follows Tier 3 standard. Firewall service and SSL certification details not provided in table 1 but it provide Cloud management portal services [15].

Sify Data Center

Sify In 1998, first Indian ISP is a pioneered Internet, data center, voice and international call centers service providers. Sify is an ICT Solutions provider and largest integrated and Services companies in India. Sify, a telecom data network infrastructure is reaching more than 1600 cities and towns in India. Sify expanded its Data centre in US with its headquarters in California's and Silicon Valley. Sify provides 100Mbps to 10Gbps Bandwidth. Its Total capacity is 42500sqft. Sify has 1.6 MW–20MW Power Capacity of Usage. Sify has six own data center and 39 third party partner data center, so, total 45 data centers. Sify provides N+1 in Noida, Bengaluru, Mumbai and N+N Redundancy in Chennai. Sifty Technology provides SLA 99.99% and Tier 3 standard. Firewall services details are not provided in table but also provide Cloud management portal and SSL Certification [16].

ESDS Data Center

ESDS is a first generation entrepreneur Managed Data Centre Service Start in 2005 and Auto-Scalable Cloud Solution provider in India. It provides services in Banking & Finance, Healthcare, Education, Energy & Utilities, Agriculture, producing, IT, recreation & Media, Travel, Telecom, Government and e-commerce. ESDS has experience in Managed Cloud Solutions, Virtualization and Disaster Recovery. ESDS has enlightened Cloud as a Software Solution to convert CAPEX into OPEX, this is eliminating expensive hardware cost, maintenance cost. ESDS cloud computing platform patented from USPTO Patent 9176788 and UK Patent GB2493812. ESDS offers 10Gbps Backbone Network Bandwidth and its capacity is 100000sqft. Power capacity of ESDS Data center is 4 kWw to 10 kW. ESDS has eight data centers in India. In details of table, ESDS provide N+N redundancy and 99.99% Service level Agreement. Tier 3 Standards follows firewall services and details are not provided in the table. Cloud Management Portal and SSL Certification services are provided [17].

Tata Communications Data Center

Tata Communications data center, uses its advanced technology solutions for skills and domain experience transversely, its international network for delivering managed solutions to multi-national corporations and communications service suppliers. Its global network contains a cultured and major submarine cable network and Tier one. Tata Communications has infinite universe of connections in the cloud and under the seas. IP network connectivity to 240 countries and areas across four hundred PoPs. And approximately 1 million square feet of data centre and colocation space across the globe. TATA Communication provides 2 Mbps to 10 Gbps Bandwidth, 3 kW to 6 kW rated AC Power Capacity and 44 Data centers in India. TATA provides Multiple Layers redundancy and 99.95% of Service level agreement and tier 3 standard follows. TATA also provide Firewall services, Cloud management Portal and SSL Certifies [10].

Webwerks Data Center

Webwerks Data Centers are located in three countries in over six geographically single data centers. One among the leaders in India for past two decades. Webwerks Data Centers are Carbon Neutral donating in the direction of Worldwide Green data center concepts. Webwerks in India is the first data centre to hold OIX-2 and host an OIX-1 IXP Mumbai-IX. They also fulfill all data center requirement for full Open IX supporter. They are cloud based by Ministry of Electronics

and Information Technology of Government of India. Their clients are in Microsoft, Google, Godrej, Canon, TATA, Netflix, Facebook, Akamai. Webwerks provide 155-Mbps bandwidth. Webwerks, Mumbai based data center has total capacity 30000sqft and 2kw to 40kw power capacity. Webwerks has five data centers in India, and provide N+1 Redundancy. In details of table, Webwerks provides 99.99% service level agreement uptime. Tier 3 and tier 4 standard follows. Webwerks provides firewall services, Cloud management Portal, SSL Certification [10].

DATA CENTER WORKING MECHANISM

We have lots of E-Mails, PDF, Word, Excel, Video, Audio etc. Electronics documents require storage. The centralized data center work for collecting, storing, processing, distributing or allowing access to data process. The computer and networking equipment that can handle the requests and serve centralize processing its call data center. Equipment got smaller and cheaper, and networking with multiple servers increase processing power exponentially. Numbers of clustered servers and related equipment installed stacked in racks that are placed in rackets an entire building or collections of structures running 24/7 and people can access them remotely. Data center deliver important services data storage, backup and recovery, data management and networking. Data centers can store and serve up Websites, E-mail and instant messaging services. Data Center provides cloud storage and applications, E-commerce transactions and online gaming [19].

Data centers are playing an important role in the cloud computing challenges and issues in various aspects [22]. Business and government use either its own data center or access to rental data center and maintain them in-house. Other rent servers are at co-location facilities and use public cloud-based services. Today all are moving into the Central Data center or cloud. Companies are running their own Data Center centralized computing networks and servers. The data center where the applications and data are stored by adding hardware to rack. The maintenance and upgradation of hardware and software are at remote locations. The clients and customers can access via the Internet or RDP Protocols to Remote Access [19].

Network Cable and wireless connectivity infrastructure that connect servers and virtualized data center services, storage, and external connectivity to end user. Storage infrastructure provides storage arrays to store the data. The servers provide processing, memory, local storage and network connectivity of the data center application. Data centers are classically organized to protect the performance and integrity of the core data components. All of these are use in one place where physical racks and cabling are used to organize and interconnect them [20]. Empathetic the client's requirement affects Data center energy consumption to improve the energy efficiency [21].

STUDY ANALYSIS OF DATA CENTERS SURVEYED

Table 1: A Comparisons of Various Data Centers Available in India

Features	Ctrlis	Reliance	GSDC	BSNL	SIFY	ESDS	TATA	Webwerks
Bandwidth	2 Mbps to 2 Gbps	STM-1	-	45Mbps	100 Mbps To 10 Gbps	10 Gbps backbone network	2 Mbps to 10 Gbps	155 Mbps
Total Capacity	1000000 sq. ft.	650000 sq. ft.	7000 sq. ft.	63440 sq. ft.	425000 sq. ft.	100000 sq. ft.	1000000 sq. ft.	30000 Sq. ft.
Power Capacity	3 kW to 15 kW	-	-	-	1.6 MW to 20 MW	4 kW to 10 kW	3 kW Or 6 kW	2 kW to 40 KW
Number of Datacenters	7	9	5	6	45	8	44	5

Redundancy	N+N	N+N	-	N+1	N+1	N+N	Multiple Layers	N+1
SLA Uptime	99.99%	100%	99.74%	99.98%	99.98%	99.99%	99.95%	99.99%
Standards	Tier 4	Tier 3	Tier 2	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3&4
Firewall Security	Yes	Yes	-	-	Yes	-	Yes	Yes
Cloud Management Portal	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes
SSL Certificates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Migration Services	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dedicated Servers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quality ISO	ISO 9001	-	-	-	ISO 9001	ISO 9001	-	ISO 9001
Security ISO	ISO 27001	-	-	-	ISO 27001	ISO 27001	ISO 27001	ISO 27001

RESULT OF STUDY ANALYSIS

From the table of comparisons of various data centers available in India we can compare various features of data centers reviewed above. Sify, ESDS and TATA have highest bandwidth capacity as compare to other data centers and BSNL has comparative least bandwidth capacity. CtrlS and TATA have Highest Built up area. CtrlS Data center uses 3kw to 15 kw per rack power capacity and it's the lowest consumption compare to another data center, 1MW = 1000kW, 1kW=1,000 watts, 1kW = 1.25 kVA. As per above table it can be revealed that the sify data centre has 45 data centers in India which has very large capacity of storage. In terms of redundancy we can reveal that CtrlS, Reliance, ESDS has better redundancy i.e. N+N. Service Level Agreement (SLA) Uptime is nearly good in all the data centers surveyed, but Reliance is giving 100% SLA. Majority of data centers follow tier 3 standards but ctrlS data centre follow tier 4 standards and which is better than others. In above table CtrlS, Reliance, Sify, TATA Communication, Weberks are provide Firewall services, but GSDC, BSNL, ESDS these three data centers are not given details about Firewall services. CtrlS, Reliance, Sift, TATA, BSNL, ESDS, webwerks are giving Cloud Management Portal but GSDC not Provide CMP. SSL Certification provides all data centre mentioned above in table 1. Migration is a comprehensive process. Existing data center to another data center transferring. In above table all data center given migration facility. From the table of comparisons of all data centers are provided dedicated server which is reserved for a server serving the network. As per comparison above table CtrlS, ESDS, Sify, webwerks are followed Quality system ISO 9000 certified data center and Reliance, BSNL, GSDC, TATA not provide Quality ISO Certification. TATA Communications, CtrlS, ESDS, Sify, webwerks ISO 27001 Information Security certified data center provide better security compared to Reliance, BSNL, GSDC.

CONCLUSIONS

In this paper, we compare Indian data centers for Bandwidth, Total Capacity, Power Capacity, Number of Data center, Redundancy level, Service Level Agreement, Standards Tier, Firewall, CMP, SSL, Migration, Dedicated Server, Quality ISO and Security ISO Data center in India. Sify, ESDS, TATA Provide 10GB Bandwidth. Data centers CtrlS & TATA are better in terms of Capacity. In above table CtrlS data center has power efficient. Sify & TATA have 45 to 44 Number of Data center. Data centers CtrlS, Reliance and ESDS are best in terms of Redundancy. Reliance Data Center gives well Service Level Agreement. CtrlS Data center is better in terms of Standards. In comparison of firewall CtrlS, Reliance, Sify,

TATA, webwerks provide firewall services. As per above table Ctrl's, Reliance, Sify, TATA, webwerks, BSNL, ESDS are facilitate Cloud Management Portal. In this paper Ctrl's, Reliance, GSDC, Sify, TATA, webwerks, BSNL, ESDS tolerate SSL Certificate, Migration Services and Dedicated Server. In above comparative Ctrl's, Sify, ESDS, Webwerks are best in quality services ISO 9001 standard. Better security Provide ISO Standard 27001 are Ctrl's, Sify, TATA, ESDS, webwerks. From the above comparative analysis, it can be reviewed that different data centers are better in different features.

Ctrl's data centers are good in overall performance considering the majority of features. Sify and ESDS are nearly good in overall performance.

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Hardiksinh Rayjada Currently studying PhD in Computer Science in Atmiya University, Atmiya Institute of Technology & Science. Under Guidance of Dr. Vaishali Parsania. My area of interest Data Center Architect and Provide better Solution like to talk about Technology and share solutions and information about new technology.



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